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EXAMINER	
SELLERS, DANIEL R	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/935,349	WEARE, CHRISTOPHER B.	
	Examiner	Art Unit	
	DANIEL R. SELLERS	2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 March 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13,15,17,21-26,30-32,34 and 35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13,15,17,21-26,30-32,34 and 35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 August 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see p. 8, filed 3/12/08, with respect to claims 30-33 have been fully considered and are persuasive. The rejection under 35 USC 102(e) of claims 30-33 has been withdrawn.

2. Regarding **claim 30**, see the new rejection under 35 USC 103(a).

Regarding Gjerdingen, it is the examiner's belief that human processing and digital signal processing (DSP) methods are taught and it is obvious to combine them in one embodiment (see column 6, lines 38-53, wherein "Data describing music attributes may also be collected by [DSP] and stored as DSP data 403B...."). Furthermore, it is believed that the spectral properties class as classified by human classification is taught by Gjerdingen. Compare the applicant's specification, p. 4, line 30 - p. 5, line 5 and p. 14, line 23 - p. 15, line 3, to Gjerdingen's teachings in figures 7A1 and 7A2. They appear to be equivalent. Likewise Gjerdingen's teachings, from column 14, line 36 to column 15, line 3, appear to teach spectral properties characteristics as determined by digital signal processing.

3. Regarding **claims 31 and 32**, see the preceding argument with respect to claim 30. The rejection can be found in the following under 35 USC 103.

4. Applicant's arguments with respect to claims 1-13, 15, 17, 21-26, 34, and 35 have been considered but are moot in view of the new ground(s) of rejection.

5. Regarding **claim 1**, see the new rejection with respect to the amended features. Also, the examiner respectfully disagrees, wherein Blum teaches comparison of a

"spectral feature vector" to the classification chain (see column 23, line 56 - column 24, line 7, specifically wherein "This vector is compared to the vectors for each class derived in the training process...." leads the examiner to believe that Blum teaches these features).

6. Regarding **claims 2-13, 15, 17, 21-26, 34, and 35**, see the preceding argument with respect to claims 30 and 1. The new rejections can be found in the following under 35 USC 103.

Claim Rejections - 35 USC § 103

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. **Claims 1-13, 15 and 17** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Blum in view of Kjaer and Gjerdingen (all previously cited).

9. Regarding **claim 1**, see Blum

A method for automatically classifying spectral properties of audio data, comprising:
applying input audio data (1) to a critical band filtering process to form first output data and (2) to an entropy calculation process to form second output data; (column 6, lines 24-28)
applying the first output data to a first derivative process to form third output data; (column 6, lines 28-30) *and*
inputting said first, second and third output data to an averaging process to form a spectral feature vector representing the input audio data (column 6, lines 32-35 and lines 45-48)*; and*
comparing the spectral feature vector to a classification chain containing pre-classified entries to determine at least one classification of the audio data (column 21, line 55 - column 22, line 20 and column 23, line 56 - column 24, line 7) *wherein the classification chain data comprises a plurality of classification vectors, wherein each vector includes data representative of a spectral properties class as classified by humans and spectral properties characteristics as determined by digital signal processing.*

Blum teaches a method for automatically classifying spectral properties of audio data, wherein a feature vector is created with the above features. The critical band filtering process, as taught by Blum, is a Mel-frequency cepstral coefficient process. Blum does not teach the entropy calculation for use in a feature vector, however Blum has described a feature vector with a plurality of metrics. Kjaer teaches an entropy calculation, wherein a musical tone is classified by notes and accidentals (see Abstract and column 4, line 55 – column 7, line 34). Kjaer teaches that entropy is useful in classifying information composed of random processes, or processes that can be better understood using probability theory. It would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teachings of Blum and Kjaer for the purpose of better classification. However, the combination of Blum and Kjaer does not appear to teach the combination of classification by humans and classification by DSP.

Gjerdingen teaches a classification system that uses listener's responses to classify audio performances (column 3, lines 23-61, column 12, line 23 - column 14, line 35, figure 4, units 401, 403, and 404, and figures 7A1-7A2). Gjerdingen also teaches digital signal processing to classify audio performances (column 9, lines 28-39, column 14, line 36 - column 15, line 6, and figure 4, unit 403B). Gjerdingen appears to teach each classification system separately, wherein it is stated that DSP techniques "may be used", however it would have been obvious to combine these methods to create a system to perform both human classification and DSP classification for better results in classification. A Press Release, titled "We Know What You Like: Can sites like

MongoMusic and LAUNCHcast really tell your musical tastes?" published in The Industry Standard on 3/7/2000 (http://web.archive.org/web/20000824112802/www.mongomusic.com/s/press_standard_030700), available from MongoMusic.com as archived by the Wayback Machine (http://www.archive.org/index.php) provides evidence that it was obvious at the time of the invention to create a "semi-automated, semi-human-based system." (see p. 2 of the Press Release). It would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teachings of Blum, Kjaer, and Gjerdingen for the purpose of better classification of audio performances.

10. Regarding **claim 2**, the further limitation of claim 1, see Blum

… wherein the audio data is divided into frames, and the method is performed frame by frame. (column 6, lines 56-58)

In the combination, Blum teaches the division of audio data into frames, wherein the method is performed frame by frame.

11. Regarding **claim 3**, the further limitation of claim 1, see

… further including calculating root mean squared values of the input audio data. (column 8, lines 1-3)

In the combination, Blum teaches RMS values.

12. Regarding **claim 4**, the further limitation of claim 2, see Kjaer

… wherein said entropy calculation process includes calculating:

$$S = -\sum_w p_w \log_2(p_w)$$

where S is the entropy of the frame, p_w is the normalized magnitude of a bin w of the audio data, and $\log_2(p_w)$ is the log base 2 of (p_w). (column 5, lines 5-12 and equation H(x))

Kjaer teaches this entropy measure.

13. Regarding **claim 5**, the further limitation of claim 2, see the preceding argument with respect to claim 3. Blum teaches the square root of the sum of squares, where the square root is a mapping function and adjusts the scale of the function.

14. Regarding **claim 6**, the further limitation of claim 2, see the preceding argument with respect to claim 1. The combination teaches this feature.

15. Regarding **claim 7**, the further limitation of claim 1, see the preceding argument with respect to claim 1. The combination teaches a frequency domain transform.

16. Regarding **claim 8**, the further limitation of claim 7, see Blum

… wherein said converting of the input audio data signal from the time domain to the frequency domain includes performing a fast fourier transform on the audio data. (column 7, lines 56-61)

In the combination, Blum teaches an FFT.

17. Regarding **claim 9**, the further limitation of claim 2, see the preceding argument with respect to claim 1. The combination teaches dividing the input signal into frames and averaging the features over all the frames.

18. Regarding **claim 10**, the further limitation of claim 1, see the preceding argument with respect to claim 1. The combination teaches a classification process using the feature vector, and this classification process determines a property class that describes the audio data (column 6, lines 7-10).

19. Regarding **claim 11**, the further limitation of claim 1, see the preceding argument with respect to claim 1. In the combination, Blum teaches a feature vector, and Blum teaches that a vector is a row vector and <u>not</u> an NxM array (column 5, lines 52-55). Blum teaches a 1xN array, wherein it is inherent that N can be 25.

20. Regarding **claim 12**, the further limitation of claim 1, see Blum

… wherein the audio data is formatted according to pulse code modulated format. (column 5, lines 24-50 and lines 64-66)

In the combination, Blum teaches a plurality of input devices in the system, wherein it is well known that optical disks containing audio data are encoded in a PCM format. Inherently Blum teaches this feature.

21. Regarding **claim 13**, the further limitation of claim 12, see the preceding argument with respect to claim 12. In the combination, Blum teaches the use of a microphone and further teaches that a sound produced into the microphone can be searched (column 3, lines 52-55). It is inherent that the digitization step converts the analog waveform to a PCM format.

22. Regarding **claim 15**, the further limitation of claim 12, see the preceding argument with respect to claim 8. The combination teaches an FFT operation, which is performed on the audio data.

23. Regarding **claim 17**, the further limitation of claim 1, see Gjerdingen

… further comprising performing a principal component analysis process on the spectral feature vector. (column 15, lines 37-44)

Blum teaches a refining process on the feature vector, but does not teach principal component analysis (PCA). Gjerdingen teaches that PCA is used to reduce the complexity of the data being analyzed.

24. **Claims 21-26** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Blum and Gjerdingen.

25. Regarding **claim 21**, see Blum

A method of classifying data according to spectral properties of the data, comprising:
assigning at least one spectral properties class to each media entity of a plurality of media entities in a data set wherein said assigning is not based on digital signal processing; (column 21, lines 55-58, line 64 – column 22, line 3 and column 22, lines 31-33)
processing each media entity of said data set to extract at least one spectral properties characteristic based on digital signal processing of each media entity; (column 22, lines 45-48)
generating a plurality of spectral properties vectors for said plurality of media entities, wherein each spectral properties vector includes said at least one spectral properties class and at least one spectral properties characteristic based on digital signal processing; and (column 22, lines 48-50)
forming a classification chain based upon said plurality of spectral properties vectors and the at least one spectral properties class (column 22, lines 55-65)*; and*
comparing unclassified data to the classification chain to estimate a classification of the unclassified data (column 21, line 55 - column 22, line 20 and column 22, line 56 - column 23, line 7) *wherein the classification chain data comprises a plurality of classification vectors, wherein each vector includes data representative of a spectral properties class as classified by humans and spectral properties characteristics as determined by digital signal processing.*

Blum teaches a method equivalent of classifying data according to its spectral properties and class with these features. However, Blum teaches a disjointed approach, wherein the spectral properties class assigning that is not based on digital signal processing and the extraction of the spectral properties characteristic based on digital signal processing are not taught to be performed together in classifying (i.e. Blum teaches the use of DSP when the non-DSP classification method fails and does not positively say they are used together to classify signals).

Gjerdingen teaches the use of DSP and non-DSP classification methods together to model, or classify, the signals (column 6, lines 38-64 and figure 4, units 401, 403A, 403B, and 404-406). It would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teachings of Blum and Gjerdingen for the purpose of placing music under many searchable elements (i.e. searching by artist, mood, genre, sub-genre, etc…) (Gjerdingen, column 3, lines 23-67, column 8, lines 34-40, and lines 50-57).

26. Regarding **claim 22**, the further limitation of claim 21, see

… further comprising:
processing an unclassified media entity to extract at least one spectral properties characteristic based on digital signal processing of the unclassified media entity; (column 21, lines 55-58)
generating a vector for the unclassified media entity including said at least one digital signal processing spectral properties characteristic; (column 21, lines 58-60)
presenting the vector for the unclassified media entity to the classification chain; and
classifying the unclassified entry with an estimate of the spectral properties class by calculating the representative spectral properties class of the subset of the plurality of vectors of the classification chain located in the neighborhood of the vector for the unclassified entity. (column 21, line 66 – column 22, line 3)

Blum teaches these features in a method of classifying data.

27. Regarding **claim 23**, the further limitation of claim 22, see Blum

… further including calculating a neighborhood distance that defines a distance within which two vectors in the classification chain space are in the same neighborhood for purposes of being in the same spectral properties class. (column 22, lines 3-20)

Blum teaches a calculation of a neighborhood distance.

28. Regarding **claim 24**, the further limitation of claim 22, see the preceding argument with respect to claim 23. Blum teaches classifying the entries according to statistical properties of the spectral properties of an entry, such as standard deviations or range values (column 21, lines 61-63). It is inherent to use the median to describe skewed sample ranges (column 22, lines 21-26).

29. Regarding **claim 25**, the further limitation of claim 22, see the preceding argument with respect to claim 23. Blum teaches a method of describing an unclassified entry according to a numerical value with these features.

30. Regarding **claim 26**, the further limitation of claim 22, see the preceding argument with respect to claim 31. Blum teaches the features of the parent claims 21 and 22, but Blum does not teach a level of confidence measure. Gjerdingen teaches a measure indicating the level of confidence regarding classification.

31. **Claims 30-32** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gjerdingen.

32. Regarding **claim 30**, see Gjerdingen

A computing system, comprising:
a computing device including:
a classification chain data structure stored thereon having a plurality of classification vectors, wherein each vector includes data representative of a spectral properties class as classified by humans and spectral properties characteristics as determined by digital signal processing; and (column 3, lines 23-61 and column 9, lines 28-39)
processing means for comparing an unclassified media entity to the classification chain data structure to determine an estimate of the spectral properties class of the unclassified media entity (column 6, line 38 – column 7, line 2).

Gjerdingen teaches a computing system with these features to create a searchable database. Gjerdingen teaches human and machine classification (figure 4, items, 401, 403 and 403B and column 6, lines 38-64), wherein the classification vector may collect DSP data (column 6, lines 48-50, column 14, line 36 - column 15, line 7, and figure 4, unit 404). It is obvious to collect both of these data and collect the data in the "acquired data" for the purpose of creating better classifications of the analyzed data. A Press Release, titled "We Know What You Like: Can sites like MongoMusic and LAUNCHcast really tell your musical tastes?" published in The Industry Standard on 3/7/2000 (http://web.archive.org/web/20000824112802/www.mongomusic.com/s/press_standard_030700), available from MongoMusic.com as archived by the Wayback Machine (http://www.archive.org/index.php) provides evidence that it was obvious at the time of the invention to create a "semi-automated, semi-human-based system." (see p. 2 of the Press Release).

33. Regarding **claim 31**, the further limitation of claim 30, see Gjerdingen

… wherein said determining of an estimate of the spectral properties class includes returning at least one number indicating the level of confidence of the spectral properties class assignment. (column 10, lines 53-57)

Gjerdingen teaches a level of confidence indicator.

34. Regarding **claim 32**, the further limitation of claim 31, see the preceding argument with respect to claims 30 and 31. It is inherent that a system using the method taught by Gjerdingen will undergo an improvement in classification with experts review and more data samples (column 8, lines 19-24).

35. **Claims 34 and 35** are rejected under 35 U.S.C. 103(a) as being unpatentable over Blum in view of Gjerdingen and Bahl (previously cited).

36. Regarding **claim 34**, Blum teaches a method for classifying audio data according to its spectral properties (abstract), comprising:

classifying by human experts each entry of a representative set of sounds according to their spectral perceptual qualities (column 3, lines 30-33, wherein users create classes)*;*
assigning each entry in the representative set at least one value based on digital signal processing (column 3, lines 4-21)*;*
reducing the results to a set of numbers called the characteristic vector of each sound (column 6, lines 24-52)*;*
storing the characteristic vector in a classification chain (column 6, lines 35-36)*;*
receiving a digital audio information (column 6, lines 13-15)*;*
dividing the digital audio information into frames (column 6, lines 56-58)*;*
determining a sonic characterization vector as a function of the energy, entropy and rate of change of frequencies in at least one frame (column 6, lines 24-30, column 7, line 61 - column 8, line 6 and column 8, lines 53-55)*; and*
presenting the characteristic vector to the classification chain, which returns an estimate of the spectral properties (column 6, lines 45-52).

Blum teaches human classification of the audio data, wherein the user of the system groups sounds into classes. Blum also teaches a sonic characterization vector as a function of the energy (i.e. sum of squares of the magnitude spectrum) and the rate of

change frequencies (i.e. the first derivative of a pitch data set, or "trajectory") in at least one frame. Blum does not teach classification by a human expert, nor does Blum teach characterization by an entropy calculation.

Gjerdingen teaches a similar classification method (abstract). Specifically, Gjerdingen uses an expert user's opinion for creating "classes" (column 3, lines 44-61). It would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teachings of Blum and Gjerdingen for the purpose of utilizing an expert musician's opinion to create better definitions between classes. The combination, however, does not teach the use of an entropy calculation to characterize sonic qualities of frames.

Bahl teaches a method of partitioning a feature space of a classification system (abstract). Specifically, Bahl teaches calculating an entropy measure (column 5, lines 55-67 and column 6, equations 2 and 3), wherein Bahl attempts to minimize entropy between feature vectors within classes and pick representative feature vectors for each class to speed up searching and comparison of new sounds (column 2, lines 8-24). It would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teachings of Blum, Gjerdingen, and Bahl for the purpose of speeding up pattern classification systems.

37. Regarding **claim 35**, the further limitation of claim 34, see the preceding argument with respect to claim 34. The combination of Blum, Gjerdingen, and Bahl teaches these features in a method of classifying data.

Conclusion

38. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Slaney, USPN 5,749,073 (previously introduced) - is used as evidence that gathering MFCC's are synonymous with critical band filtering;

Pi et al., US PGPub 2004/0015357 (previously introduced) - is used as evidence that gathering MFCC's are synonymous with critical band filtering;

Mauuary et al., USPN 6,157,909 (previously introduced) - is used as evidence that gathering MFCC's are synonymous with critical band filtering;

Glaser et al., USPN 7,003,515 (previously introduced) - teaches classification using vectors (see Brief Summary, column 1-2);

Logan et al., USPN 7,031,980 (previously introduced) - teaches different spectral representations of the input signal and MFCCs (see Detailed Description, column 5-6);

Forbes.com “MongoMusic Fans Include Microsoft” (previously introduced) - teaches expert classification and DSP classification; and

Snyder, Julene, The Industry Standard's Beat Sheet A Weekly Report on the Convergence of Music and the Net, "We Know What You Like: Can sites like MongoMusic and LAUNCHcast really tell your musical tastes?", 3/7/00, http://web.archive.org/web/20000824112802/www.mongomusic.com/s/press_standard_030700 - teaches "semi-automated, semi-human-based system" for classification of audio.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL R. SELLERS whose telephone number is (571)272-7528. The examiner can normally be reached on Monday to Friday, 9am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Suhan Ni can be reached on (571)272-7505. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Daniel R. Sellers/
Examiner, Art Unit 2615

/Suhan Ni/
Primary Examiner, Art Unit 2614